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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/069,900	02/26/2002	Hisaaki Gyoten	10059-410US(P23466-01)	5187

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AKIN GUMP STRAUSS HAUER & FELD L.L.P.
ONE COMMERCE SQUARE
2005 MARKET STREET, SUITE 2200
PHILADELPHIA, PA 19103-7013

EXAMINER	
ALEJANDRO, RAYMOND	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 01/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/069,900	GYOTEN ET AL.	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 4* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 4* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/17/04 has been entered.

This office action is in reply to the foregoing RCE and its associated amendment. The applicants have overcome the double patenting rejection and the 35 USC 103 rejection . Refer to the abovementioned amendment for specific details on applicant's rebuttal arguments. With respect to the double patenting rejection, it is noted that a terminal disclaimer was submitted on 08/03/04 to obviate such rejection. However, the present claims are rejected again over new art as seen below and for the reasons of record:

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

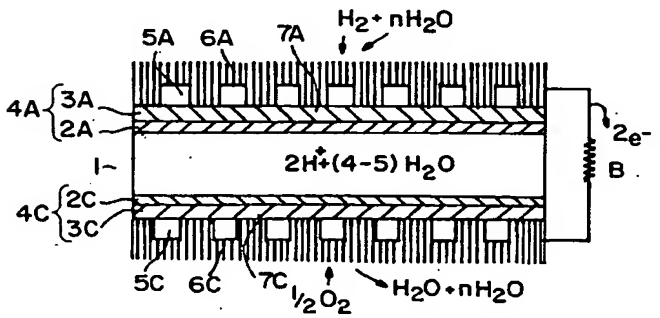
2. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tozawa et al 5607785 in view of Saito et al US 2002/0034672 and further in view of Saito et al 6348279, and further in view of Ambros et al 6030552.

The instant application is directed to a polymer electrolyte fuel cell wherein the disclosed inventive concept comprises the specific electroconductive resin layer on the separator substrate.

With respect to claim 1:

Tozawa et al disclose a polymer electrolyte electrochemical cell (title) wherein the electrochemical cell employs a solid polymer electrolyte membrane (ion exchange membrane) (COL 1, lines 7-10). *Figure 1* below shows a constitution of a polymer electrolyte fuel cell in which an anode side gas diffusion electrode 4A consisting of an anode side porous catalyst layer 2A and an anode side current collector layer 3A bonded with each other is bonded to one surface of the ion exchange membrane 1, and an cathode side porous catalyst layer 2C and a cathode side current collector 3C bonded with each other is bonded to the other surface of the ion exchange membrane 1 (COL 1, lines 21-44). A separator 6A having reaction gas supply grooves 5A is in contact with the anode side gas diffusion electrode 4A and current collecting portions 7A are constituted between the adjacent supply grooves 5A of the separator 6A. Similarly, a separator 6C having reaction gas supply grooves 5C is in contact with the cathode side gas diffusion electrode 4C and current collecting portions 7C are constituted between the adjacent supply grooves 5C of the separator 6C (COL 1, lines 21-44). It is disclosed that by connecting both current collector portions 7A and 7C with a load 8, and supplying hydrogen to the anode and oxygen to the cathode, electric power can be taken out through the load 8. *Thus, the separator material is required to be a conductive material.*

FIG. 1 PRIOR ART



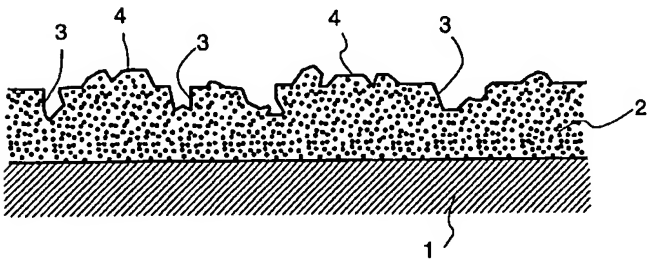
Tozawa et al disclose a solid polymer electrolyte fuel cell according to the foregoing. However, Tozawa et al do not expressly disclose: a) the separator comprising a metal substrate and the specific electroconductive resin layer comprising the specific resin and electroconductive particulate substance.

With respect to claim 1:

Saito et al disclose a fuel cell separator (title/section 0003) which can be used in solid polymer type fuel cell (0007) wherein the separator has a film on the surface (ABSTRACT). It is disclosed that the separator comprises a conductive coating of particular composition on a base material to form on the base material a film made of the conductive coating (SECTION 0020). It is also disclosed that as the base material for fuel cell separator a metal material e.g. titanium, aluminum, stainless steel can be shaped into a separator.

Figure 1 below shows the separator 1 having a film 2.

Fig.1



The conductive coating comprises a conductive powder and a binder (SECTION 0021). The conductive powder includes, for example, a powder of a carbon material typified by natural graphite, acetylene black, carbon black, etc. (SECTION 0021) wherein the conductive powder have a specific particle diameter (SECTION 0022). The binder used in the conductive coating

may be any binder including, for example, thermosetting resin, thermoplastic resin, rubber or the like (SECTION 0023). The thermosetting resin includes, for example, *polyamideimide* and fluororesin, among others (SECTION 0025). *It is noted that polyamideimide resin is a resin having basic radicals.*

As to claim 3:

It is disclosed that the conductive coating comprises a conductive powder wherein the conductive powder includes, a powder of a carbon material typified by natural graphite, artificial graphite, carbon black, ketjen black, expanded graphite or the like (SECTION 0021). It is also disclosed that there is no particular restriction as to the kind of the conductive powder as long as the powder is conductive (SECTION 0021). It is further disclosed that as the base material for fuel cell separator a carbon separator material made of glassy carbon can be used (SECTION 0035). *It is noted that glassy carbon is also called vitreous carbon.* It is also disclosed that a coated separator material can be obtained by coating the separator material with a noble metal or carbon material and a separator material obtained by combining two or more kinds of the above separator materials (SECTION 0035).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the separator of Tozawa et al by comprising the specific metal substrate and the specific electroconductive resin layer comprising the specific resin and electroconductive particulate substance of Saito et al because Saito et al teaches that separators for solid polymer type fuel cell are desired to have electrical conductivity and low electrical resistance and the use of Saito et al's specific metal separator and conductive coating of particular composition on the separator improves the electrical conductive and low electrical

resistance behavior of the separator. Furthermore, since the separator has a role of transferring the electricity generated as the gas diffusion electrode of the fuel cell to the exterior, those of ordinary skill in the art would be motivated to employ the specific metal separator and conductive film material of Saito et al to obtain a fuel cell separator having enhanced conductivity.

In addition, neither Tozawa et al nor Saito et al'672 expressly disclose the resin layer comprising the vitreous carbon.

Saito et al'279 disclose separator for polymeric electrolyte fuel cell wherein the separator is a composite material obtained by coating a metal material with a resin, glassy carbon or a metal (COL 2, lines 21-33/ COL 3, lines 10-25/ COL 4, lines 10-33/ CLAIM 2). *It is noted that glassy carbon is also called vitreous carbon.*

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the resin layer comprising the vitreous carbon of Saito et al'279 on the separator of both Tozawa et al and Saito et al'672 as Saito'279 teach that the specified resin layer provides a separator for a polymer electrolyte fuel cell having suitable surface roughness which alleviates the problems of the prior art by having low contact resistance at the interface with the electrode of the fuel cell. Furthermore, since Saito et al employs glassy carbon for making a layer to be provided on the conducting separator material, those of ordinary skill in the art would be motivated to use an electroconductive particulate substance such as glassy carbon to make the required conducting coating or film on the separator material. Moreover, Saito et al do encompass to use glassy carbon as the electroconductive particulate substance because his disclosure teaches that any kind of conductive powder as long as the powder is conductive can be

used in the film as well as the possibility to obtain a coated separator material by coating the separator material with a carbon material with the proviso that the separator as a whole can be obtained by combining two or more kinds of the disclosed separator materials including glassy carbon.

Additionally, none of the preceding references disclose the specific particle diameter of the vitreous carbon powder.

Ambros et al disclose powdery vitreous carbon and a paste made therefrom for producing resistive films having predetermined electrical conductivity. It is disclosed that the vitreous carbon having specific resistivity is ground in a mill together with the binding agent to a grain size of less than 10 μm and/or 8 μm (ABSTRACT/ COL 2, lines 40-45/ COL 2, line 65 to COL 3, line 7/ COL 4, line 31-36). Ambros et al's disclosure relates to film made from a paste comprising a powdery vitreous carbon as an electrically conductive component in admixture with an electrically non-conductive component (COL 1, line 5-10 and lines 58-61). It is further taught that the method for producing powdered, vitreous carbon includes the processing of a resin (COL 2, lines 10-15); as well as that the electrical resistivity of the vitreous carbon is determined by the selective use of the process parameters (COL 2, lines 20-23); and that the conductivity of the glass carbon powder can also be influenced by other factors (COL 3, lines 11-15). Ambros et al also discuss how the vitreous carbon can be made more electrically conductive (COL 5, lines 1-5). *Therefore, Ambros et al's teachings at once envisage the formation of electrically conductive film made of vitreous carbon powder* (← ***emphasis added***).

Examiner's note: *With respect to the specific surface area of the vitreous carbon powder, it is asserted that having shown that the prior art employs glassy carbon having a*

*particle size of less than 8 μm or 10 μm, and assuming arguendo that applicants' correlation between the particle size and the specific surface area is correct and accurate (refer to the amendment of 11/17/04 at page 4, 2nd and 3rd full paragraphs and the table contained therebetween), consequently, the glassy carbon of the prior art must exhibit a specific surface area ranging from approximately 0.3 m^2/g to 0.5 m^2/g. Therefore, the above-mentioned characteristic, property and/or function is thus inherent as the carbon composition material (i.e. the glassy (vitreous) carbon) recited in the reference is substantially identical to that of the claims and has also a particle size within the claimed range, and therefore, claimed properties, characteristics or functions are presumed to be inherent (**MPEP 2112. Requirements of Rejection Based on Inherency**). Thus, the vitreous carbon of prior art seems to be identical except that the prior art is silent as to an inherent function, property and/or characteristic. In that, it is noted that the extrinsic evidence (including applicants' particle size-to-specific surface area correlation) makes clear that the missing descriptive matter is necessarily present in the glassy carbon described in the reference, and that it would be so recognized by persons of ordinary skill. Accordingly, products of identical chemical composition or characteristics **can not have mutually exclusive properties**, and thus, the claimed property of the vitreous carbon powder having the specific surface area, is necessarily present in the prior art material.*

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the vitreous carbon powder having the specific particle diameter of Ambros et al in the resin layer of the separator of Tozawa et al, Saito et al'672 and Saito'279 because Ambros et al disclose that vitreous carbon powder can be used to make various film exhibiting varying conductivities per square unit of surface area in the film. Accordingly, the

specific vitreous carbon powder is suitable for producing paste having predetermined electrical conductivity and resistive film made from the paste. Additionally, Ambros et al further teach that it is possible to produce various resistive film with a set but constant packing density of the vitreous carbon, having maximum mechanical and electrical stability. Therefore, Ambros et al's teachings at once envisage the formation of electrically conductive film made of vitreous carbon powder. Additionally, it is reasonable, logical, practical and rational to combine Ambros et al's teaching with the remaining references firstly because Ambros et al's disclosure is strictly directed to the production of powdery vitreous carbon and film formed thereof, and secondly because Ambros et al openly address subjects related to the electrical conductivity of vitreous carbon film materials. Accordingly, Ambros et al concentrate on the same problem of providing suitable electrical conductive film made of vitreous carbon powder for electrically conductive applications. Thus, the references are pertinent to one another and within applicants' field of endeavor. Moreover, Ambros et al directly teach the use of vitreous carbon powder within the claimed range.

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Tozawa et al 5607785-Saito et al US 2002/0034672 and Saito et al 6348279, and further in view of Ambros et al 6030552 as applied to claim 1 above, and further in view of the Japanese publication JP 11-126620.

Tozawa et al, Saito et al'672 and Saito et al'279 are applied, argued and incorporated herein for the reasons above.

Note: for purpose of prosecution, the transitional claim language "having" in claim 4 has been interpreted as open-end language.

As to claim 4:

In addition, *Saito et al'672* disclose a coated separator base material obtained by coating the base separator material with a noble metal or a carbon material (SECTION 0035). *Accordingly, the separator material of Saito et al would include the separator base material wherein the base material is first coated with a noble metal or a carbon material and further having the conductive coating comprising the conductive powder and the resin thereon.*

However, neither Tozawa et al nor Saito et al expressly disclose the specific layer material.

The JP'620 publication teaches a separator for a fuel cell constituting a solid polymer type fuel cell comprising a material made by applying a coating layer composed of Sn or WC on a surface the separator material (ABSTRACT).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the separator layer of Tozawa et al, Saito et al'672 , Saito et al'279 and Ambros et al by having the specific layer material of the JP'620 publication as the JP'620 publication teaches that by applying a coating layer composed of the disclosed specific layer material the separator surface exhibits excellent corrosion resistance characteristics. In addition, the coating layer is high in electroconductivity and thus, current collecting performance is prevented from lowering.

Response to Amendment

4. Applicant's arguments with respect to claims 1 and 4 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Examiner
Art Unit 1745